

U.S. Patent Application Serial No. 10/647,237
Response filed November 17, 2005
Reply to OA dated June 21, 2005

AMENDMENTS TO THE CLAIMS:

Please cancel claim 2 without prejudice or disclaimer, and amend claims 1, 5, 6, 9, 15, 20, and 21, as follows. This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently amended): A dielectric waveguide, comprising:

a first single crystal magnesium oxide block having a surface of the face (001), (100) or (010), and having other faces; ~~and~~

a first copper oxide superconducting film disposed on said surface in a c-axis crystal orientation perpendicular to four or more of the other faces of said block;

a second single crystal magnesium oxide block having a surface of the face (001), (100) or (010); and

a second copper oxide superconducting film disposed on said surface of said second single crystal magnesium oxide block in a c-axis crystal orientation perpendicular to said surface,

wherein said first single crystal magnesium oxide block has a face oriented at a 45 degree angle to the face (011), (101) or (110), and said second copper oxide superconducting film comes in contact with said surface of said first single crystal magnesium oxide block.

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Claim 2 (Canceled):

Claim 3 (Previously presented): The dielectric waveguide according to claim 1, wherein said first copper oxide superconducting film is an oxide high-temperature superconductor composed of any one kind or more showing the crystal structure anisotropy of $\text{Bi}_{n1}\text{Sm}_{n2}\text{Ca}_{n3}\text{Cu}_{n4}\text{O}_{n5}$ ($1.8 \leq n1 \leq 2.2$, $1.8 \leq n2 \leq 2.2$, $0.9 \leq n3 \leq 1.2$, $1.8 \leq n4 \leq 2.2$, $7.8 \leq n5 \leq 8.4$), $\text{Pb}_{k1}\text{Bi}_{k2}\text{Sr}_{k3}\text{Ca}_{k4}\text{Cu}_{k5}\text{O}_{k6}$ ($1.8 \leq k1+k2 \leq 2.2$, $0 \leq k1 \leq 0.6$, $1.8 \leq k3 \leq 2.2$, $1.8 \leq k4 \leq 2.2$, $1.8 \leq k5 \leq 2.2$, $9.5 \leq k6 \leq 10.8$), $\text{Y}_{m1}\text{Ba}_{m2}\text{Cu}_{m3}\text{O}_{m4}$ ($0.5 \leq m1 \leq 1.2$, $1.8 \leq m2 \leq 2.2$, $2.5 \leq m3 \leq 3.5$, $6.6 \leq m4 \leq 7.0$), $\text{RE}_{p1}\text{Ba}_{p2}\text{Cu}_{p3}\text{O}_{p4}$ (RE: consisting of any of La, Nd, Sm, Eu, Gd, Dy, Ho, Er, Tm, Yb, Lu among rare-earth elements, $0.5 \leq m1 \leq 1.2$, $1.8 \leq m2 \leq 2.2$, $2.5 \leq m3 \leq 3.5$, $6.6 \leq m4 \leq 7.0$).

Claim 4 (Previously presented): The dielectric waveguide according to claim 1, further comprising: a protective film containing silver disposed on the surface of said first copper oxide superconducting film.

Claim 5 (Currently amended): The dielectric waveguide according to claim 1, further comprising: a bonding film ~~formed~~ provided to bond said first copper oxide superconducting film to other members, and consisting of a silver paste or indium containing an organic substance not containing a glass frit, and a silver powder.

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Claim 6 (Currently amended): The dielectric waveguide according to claim 1, further comprising a fixture to fix said first single crystal magnesium oxide block on which said first copper oxide superconducting film is disposed, to other members,

wherein the portion of the fixture that directly bonds to said first copper oxide superconducting film is composed of ~~any one or more kinds among~~ selected from the group consisting of Fe-Ni-based alloys with low thermal coefficient, sintered magnesium oxide, stabilized zirconia, partially stabilized zirconia, and polytetrafluoroethylene and ethylene tetrafluoroethylene which are deformable even at 100 K or less.

Claim 7 (Previously presented): The dielectric waveguide according to claim 1, further comprising a pedestal to fix said first single crystal magnesium oxide block on which said first copper oxide superconducting film is disposed.

Claim 8 (Original): The dielectric waveguide according to claim 7, wherein said first single crystal magnesium oxide block is fixed mechanically on said pedestal.

Claim 9 (Currently amended): The dielectric waveguide according to claim 2 ~~1~~, wherein said first and second copper oxide superconducting films are oxide high-temperature superconductor composed of ~~any one kind or more~~ compounds showing the crystal structure anisotropy selected from the group consisting of $\text{Bi}_{n1}\text{Sr}_{n2}\text{Ca}_{n3}\text{Cu}_{n4}\text{O}_{n5}$ ($1.8 \leq n1 \leq 2.2$, $1.8 \leq n2 \leq 2.2$, $0.9 \leq n3 \leq 1.2$, 1.8

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$\leq n_4 \leq 2.2$, $7.8 \leq n_5 \leq 8.4$), $Pb_{k_1}Bi_{k_2}Sr_{k_3}Ca_{k_4}Cu_{k_5}O_{k_6}$ ($1.8 \leq k_1+k_2 \leq 2.2$, $0 \leq k_1 \leq 0.6$, $1.8 \leq k_3 \leq 2.2$, $1.8 \leq k_4 \leq 2.2$, $1.8 \leq k_5 \leq 2.2$, $9.5 \leq k_6 \leq 10.8$), $Y_{m_1}Ba_{m_2}Cu_{m_3}O_{m_4}$ ($0.5 \leq m_1 \leq 1.2$, $1.8 \leq m_2 \leq 2.2$, $2.5 \leq m_3 \leq 3.5$, $6.6 \leq m_4 \leq 7.0$), $RE_{p_1}Ba_{p_2}Cu_{p_3}O_{p_4}$ (RE: consisting of any of La, Nd, Sm, Eu, Gd, Dy, Ho, Er, Tm, Yb, Lu among rare-earth elements, $0.5 \leq m_1 \leq 1.2$, $1.8 \leq m_2 \leq 2.2$, $2.5 \leq m_3 \leq 3.5$, $6.6 \leq m_4 \leq 7.0$).

Claim 10 (Previously presented): The dielectric waveguide according to claim 1, further comprising a fixture to fix said first single crystal magnesium oxide block on which said first copper oxide superconducting film is disposed, on a pedestal.

Claim 11 (Original): The dielectric waveguide according to claim 10, wherein said fixture is made of brass.

Claim 12 (Original): The dielectric waveguide according to claim 11, wherein said pedestal is made of brass.

Claim 13 (Previously presented): The dielectric waveguide according to claim 12, wherein said fixture is bonded with indium to said first single crystal magnesium oxide block on which said first copper oxide superconducting film is disposed.

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Claim 14 (Original): The dielectric waveguide according to claim 13, wherein said fixture is fixed mechanically on said pedestal.

Claim 15 (Currently amended): The dielectric waveguide according to claim 6, further comprising a pedestal for fixing said first single crystal magnesium oxide block on which said first copper oxide superconducting film is disposed, together with said fixture,

wherein the portion to directly bond to said first copper oxide superconducting film is composed of ~~any one or more kinds among~~ selected from the group consisting of Kovar, Invar Fe-Ni-based alloys with low thermal coefficients, sintered magnesium oxide, stabilized zirconia, partially stabilized zirconia, and polytetrafluoroethylene and ethylene tetrafluoroethylene which are deformable even at 100 K or less.

Claim 16 (Original): The dielectric waveguide according to claim 15, wherein said fixture is fixed mechanically on said pedestal.

Claim 17 (Previously presented): The dielectric waveguide according to claim 1, further comprising:

a pedestal to fix said first single crystal magnesium oxide block on which said first copper oxide superconducting film is disposed; and

a bonding layer to bond said first copper oxide superconducting film to said pedestal.

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Claim 18 (Original): The dielectric waveguide according to claim 17, wherein said bonding layer is a silver paste containing a silver powder and an organic substance which does not contain a glass frit.

Claim 19 (Original): The dielectric waveguide according to claim 18, wherein said pedestal is a sintered magnesium oxide plate.

Claim 20 (Currently amended): A method of production for a dielectric waveguide comprising:

a step of preparing ~~to prepare~~ a first single crystal magnesium oxide block having a surface of face (001), (100) or (010) and having other faces; ~~and~~

a step of forming ~~to form~~ on said surface a first copper oxide superconducting film in a c-axis crystal orientation perpendicular to four or more of the other faces of said block;

a step of preparing a second single crystal magnesium oxide block having a surface of the face (001), (100) or (010); and

a step of forming a second copper oxide superconducting film disposed on said surface of said second single crystal magnesium oxide block in a c-axis crystal orientation perpendicular to said surface,

wherein said first single crystal magnesium oxide block has a face oriented at a 45 degree angle to the face (011), (101) or (110), and said second copper oxide superconducting film comes

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in contact with said surface of said first single crystal magnesium oxide block.

Claim 21 (Currently amended): The method of production for the dielectric waveguide according to claim 20, wherein said ~~forming~~ step of forming a first copper oxide superconducting film is to form comprises forming the first copper oxide superconducting film by a sputtering process or a pulse laser deposition process.